PODS

An Ecological Micro-Sensor Network

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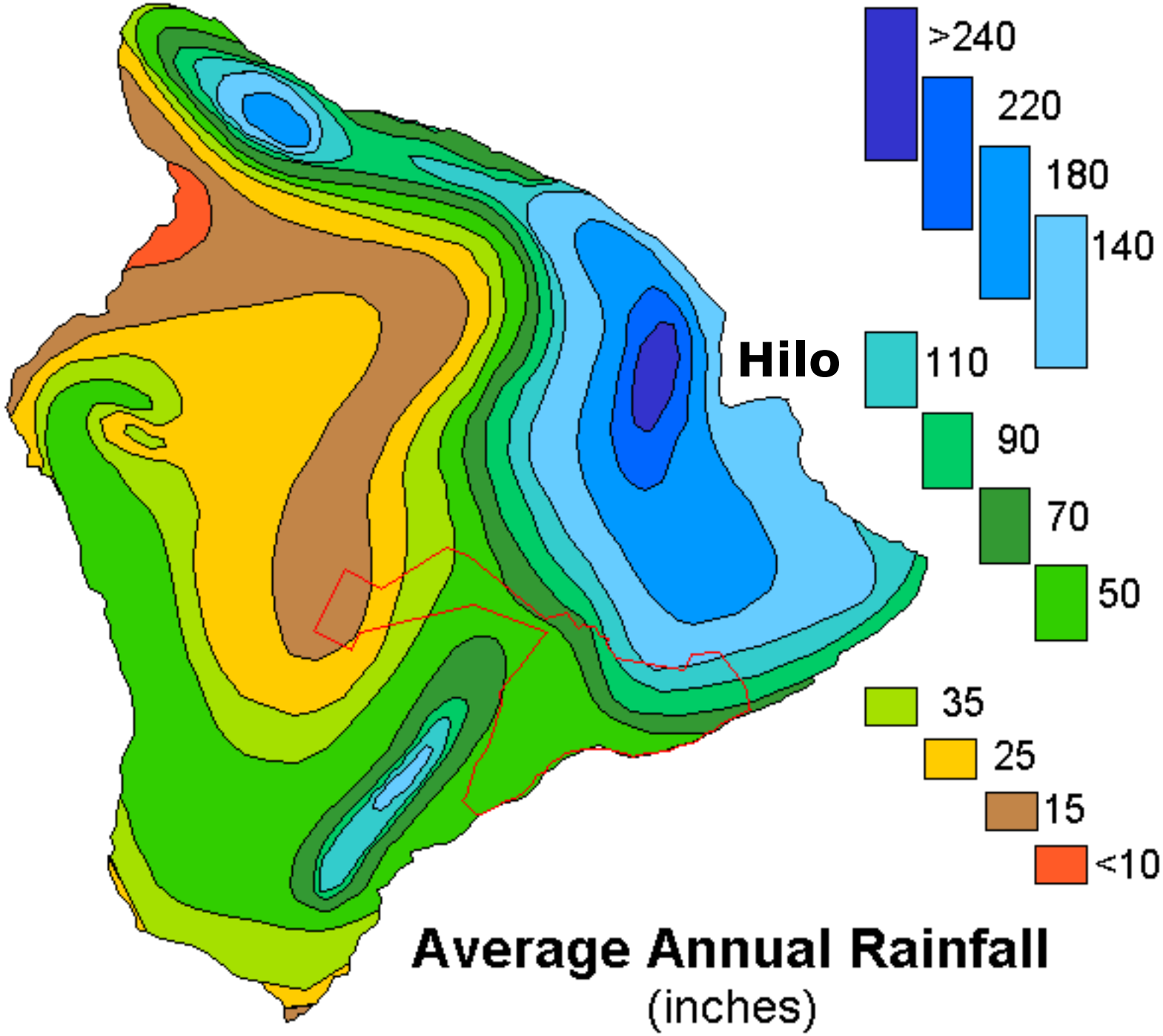
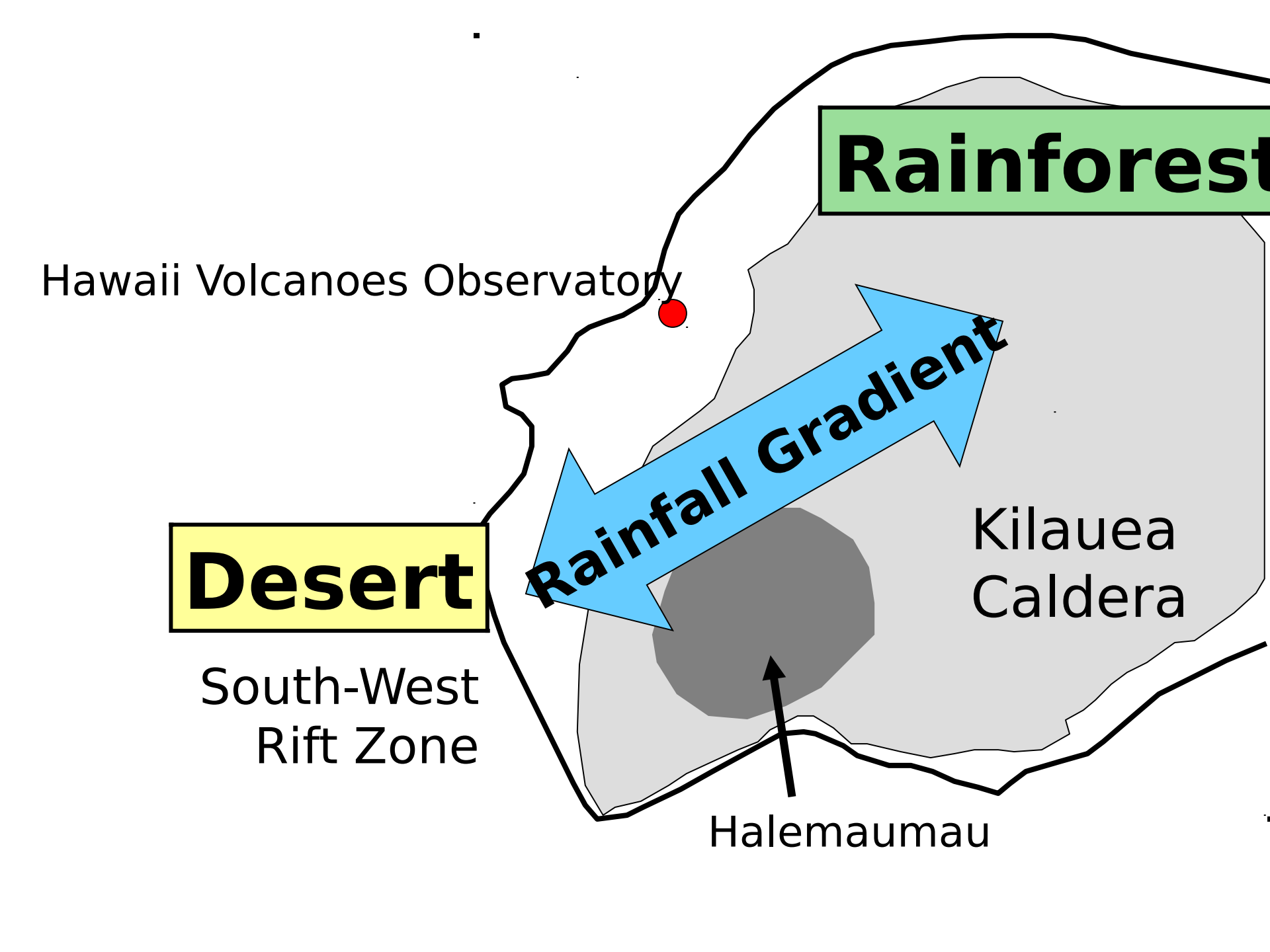
Silene hawaiiensis

Listed as “threatened”
About 2,000 plants remain
All on the Big Island


Hilo
>240
220
180
140
110
90
70
50
35
25
15
<10
Average Annual Rainfall
(inches)


Rainforest
Hawaii Volcanoes Observatory
Rainfall Gradient
Desert
Kilauea
Caldera
South-West
Rift Zone
Halemaumau

South-West Rift Zon

Silene habitat

25
MPH
NEXT 1.
MILES

MIT Media Lab

Computer
Radio
Network Software

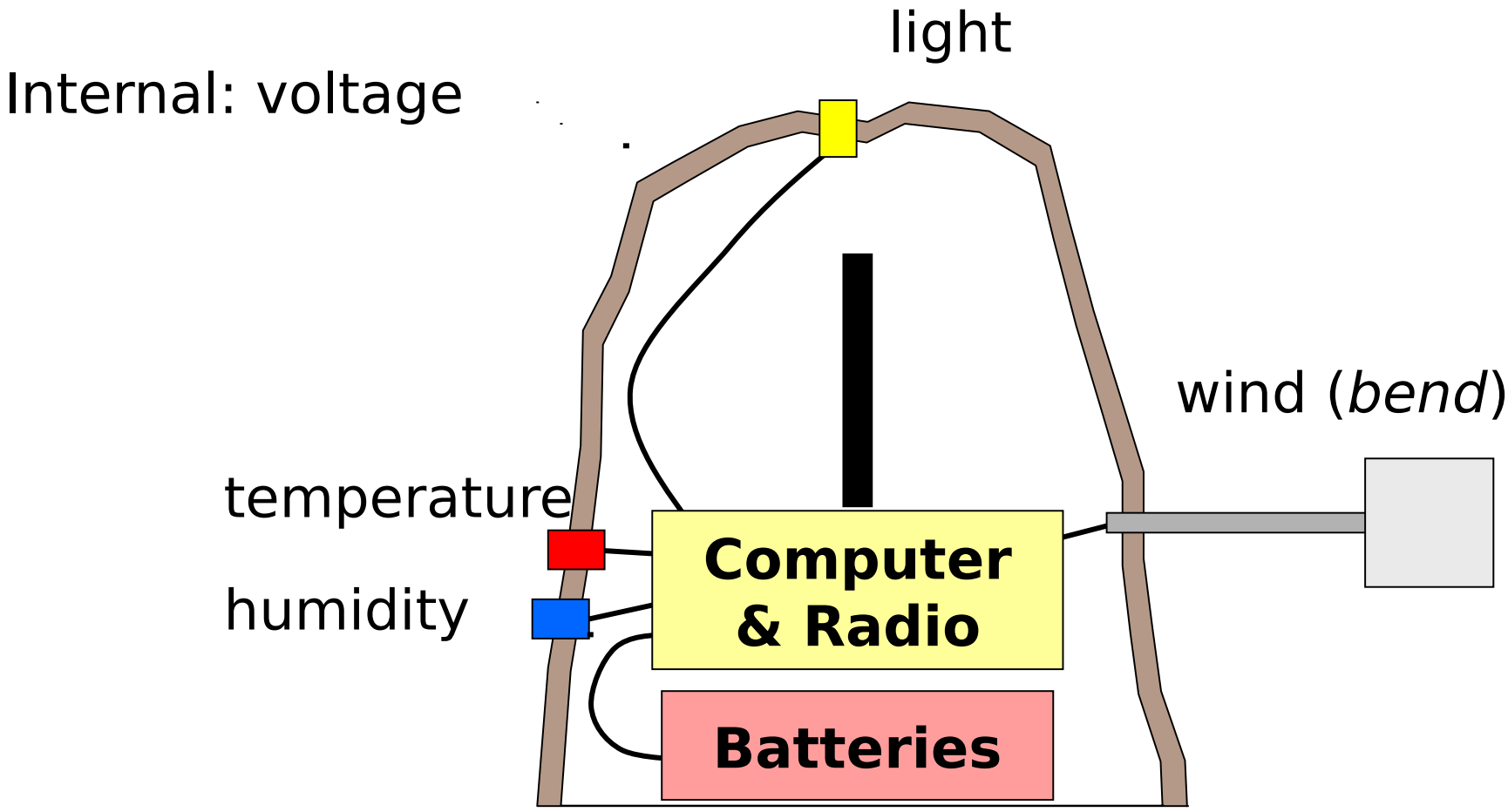
TephraNet

University of Hawaii

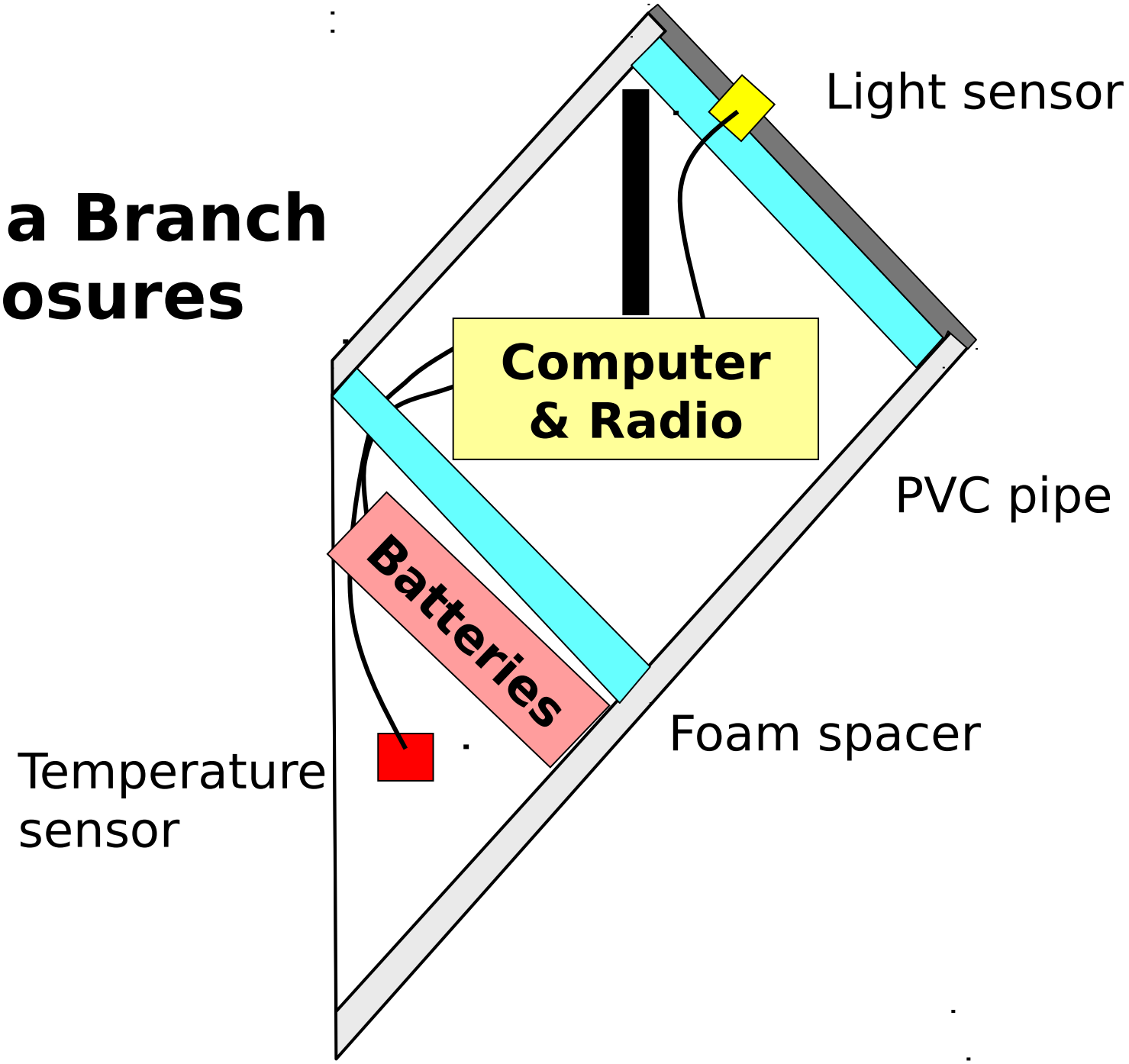
Enclosures
Sensors
Power
Field Site & Study Problem

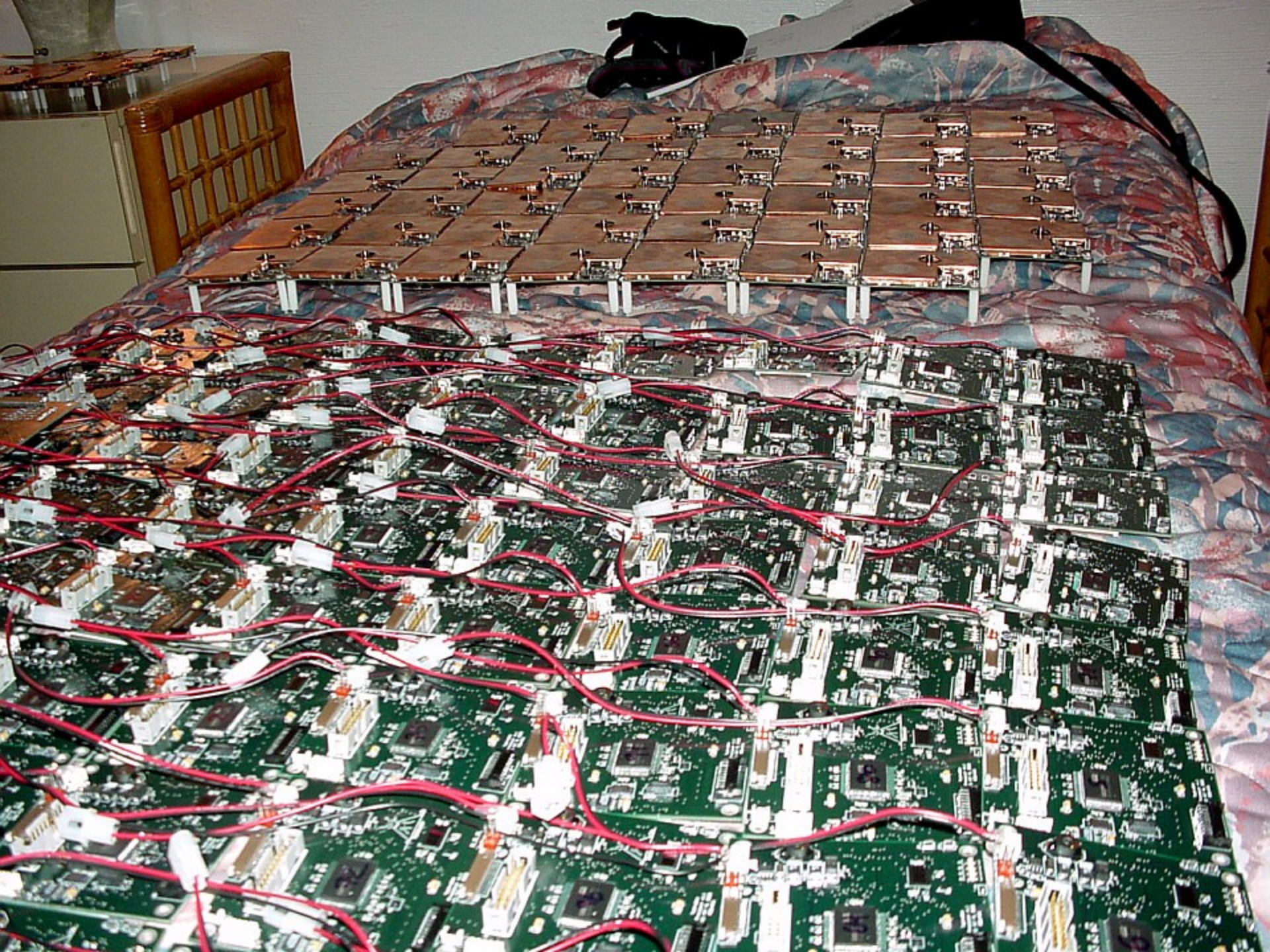
PODS

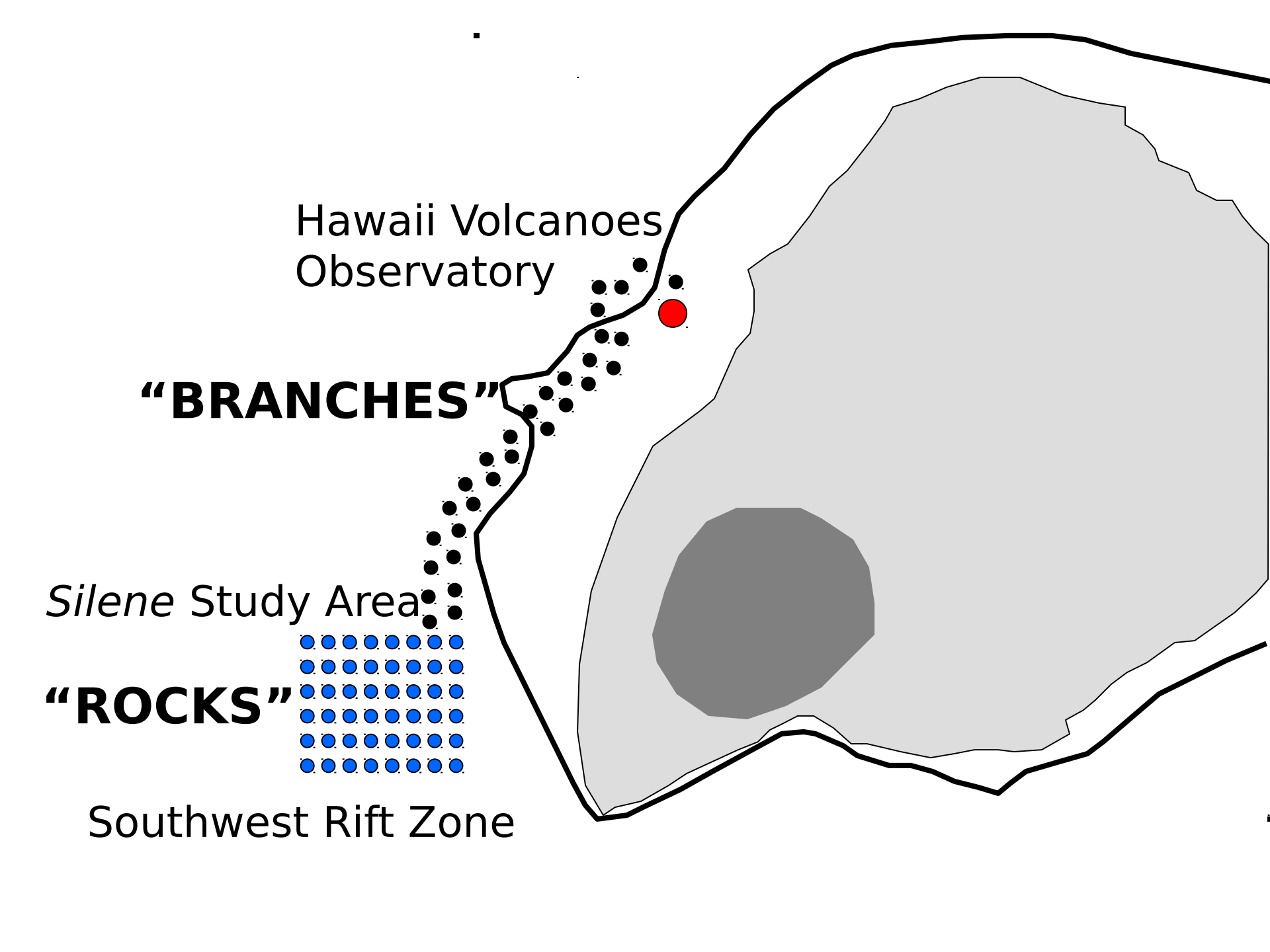
Rock Enclosures



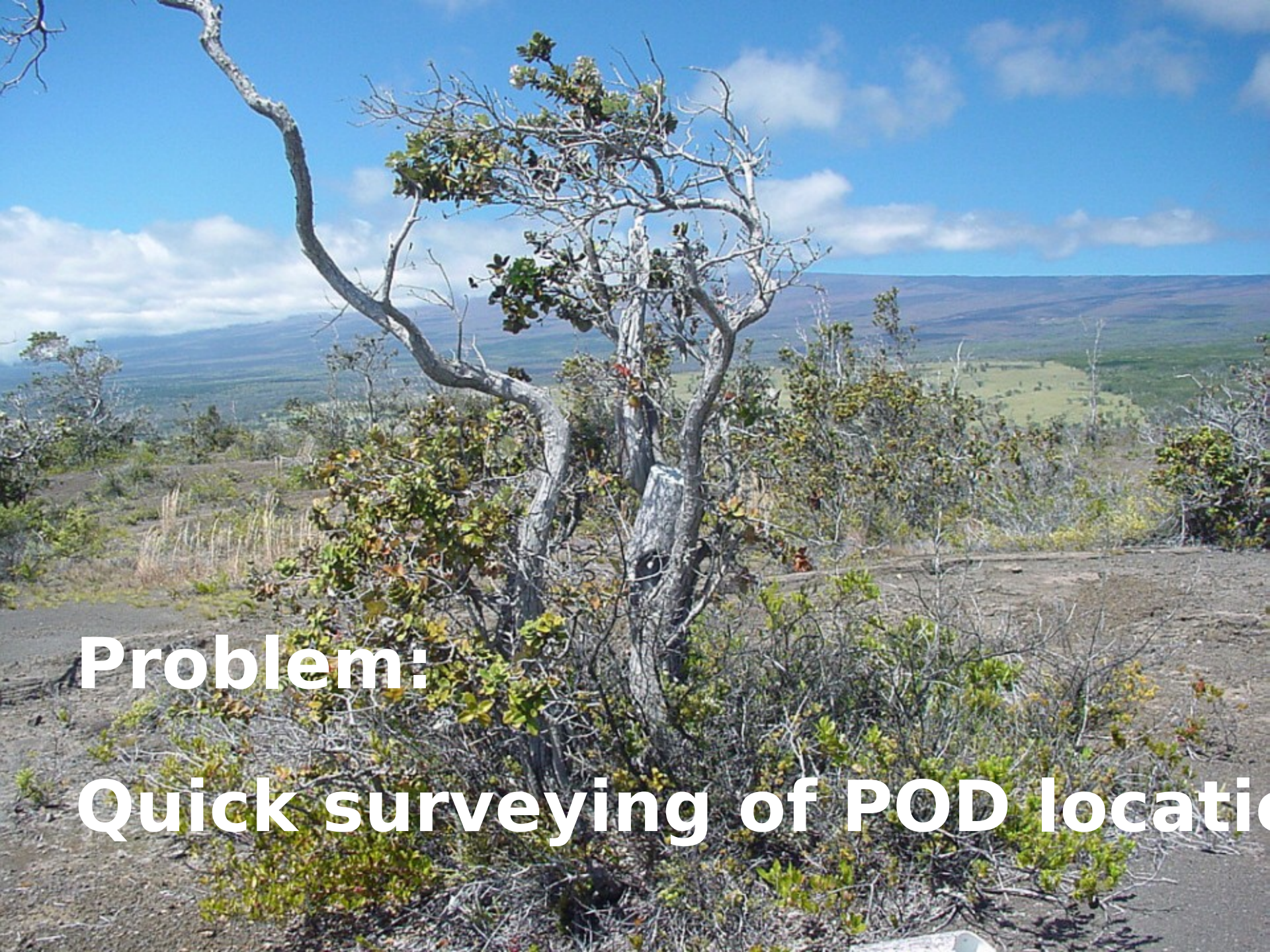
`Ohia Branch Enclosures






Hawaii Volcanoes
Observatory
“BRANCHES”
Silene Study Area
“ROCKS”
Southwest Rift Zone

Planned Redeployment
New computers & radi
New power sources
Smaller enclosures


Problem:
Quick surveying of POD locati

“Walking Stick

Locate & document instrument sites

- **Digital Camera inside UW case**
- **GPS**
- **Laser Ranger**
- **Hiking Stick**

Silene Monitoring

Mark I POD
PC 104 computer
802.11b communications

Ziploc
EZ Fill
TALL SIZE
KYOTO

Computer and Communications
Battery
Camera

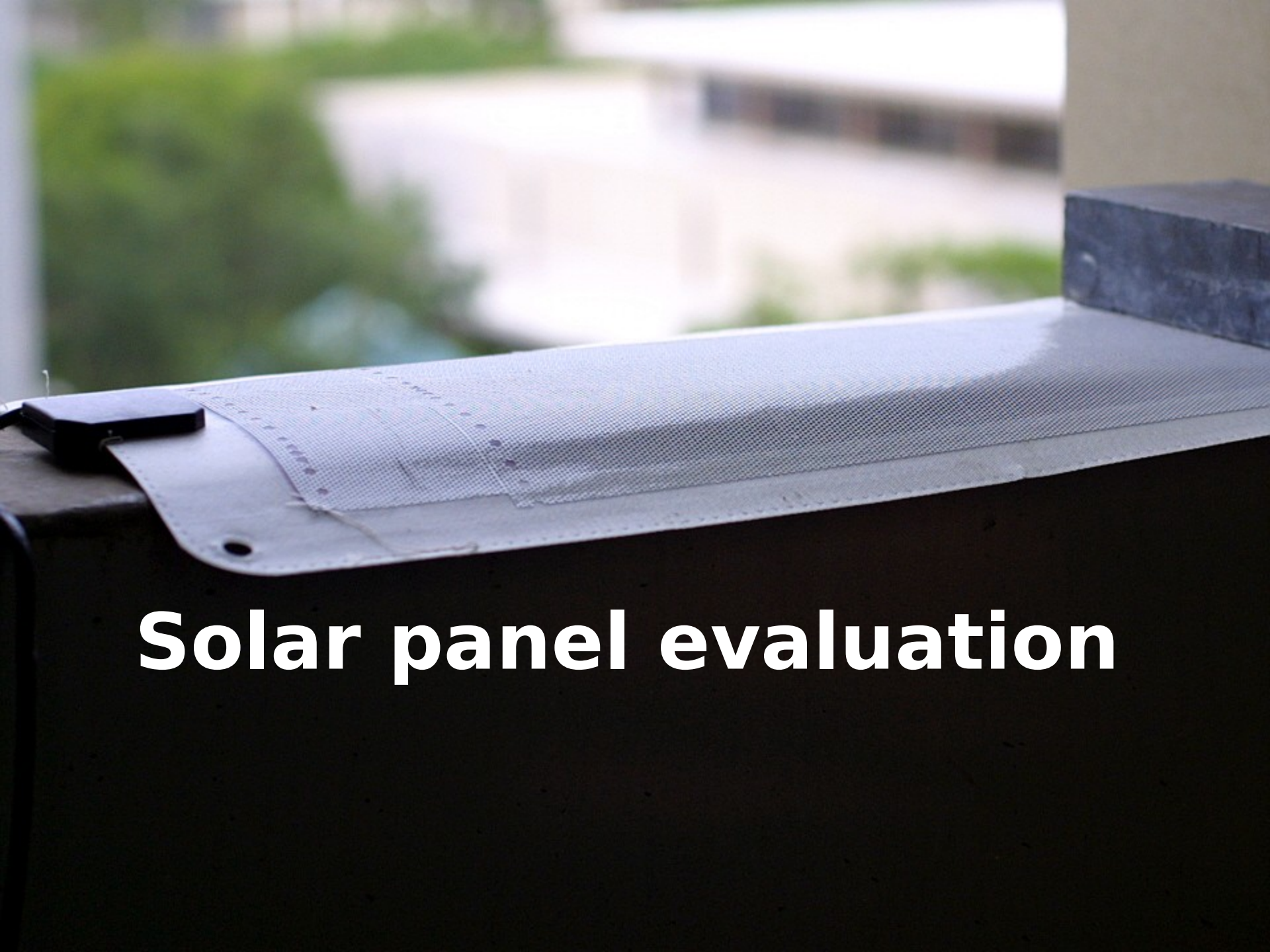
Silene

Goal: *Silene* phenolo

Hourly photos

Single plant

Operational ~ 6 weeks
Problem: Power Source


Solar panel evaluation

Final Lab Testing: 4 Mark I PO

- Hidden Cameras
- Hidden Solar Power
- Wireless Communicatio

Mark II Pods

- Compaq iPaq 3650 running Linux
- Serial interface to Nikon
- 520ma fully on, 50ma in sleep w/PCMCIA Orinoco card
- CF 802.11b card may dramatically lower power consumption
- Working on fixing power down and timed power up routines
- Bluetooth cameras next?

Relaying Data between PODS

- Developing communication protocols
- Interim: Solar powered 802.11b repeaters

Considerations

- VoIP for emergency phones
- Multipoint vs. dual channel parabolic repeaters